CHAPTER 8

MAINTENANCE AND REPAIR OF BRIDGE SURFACES

8-1. Introduction

There are many types and sizes of bridges on military installations. These range from single-span untreated timber bridges to multiple-span steel and concrete bridges. This section deals mainly with the maintenance of various types of pavement surfaces common to bridge structures predominant on military installations.

8-2. Types of bridge surfaces

The type of bridge and bridge surface used should be tailored to the traffic it will receive. The parapets or siderails should provide for safety considerations while also providing an avenue for snow, dirt, or other deleterious material to be removed.

a. Timber. Bridges have the entire buildup of the roadway constructed of wood. A bituminous wearing surface will be provided on all laminated timber floors to reduce wear and prolong life. The bituminous wearing surfaces on the various types of timber floors will be properly maintained in smooth condition. Surface roughness induces excessive vibration which causes timbers to work loose and wear rapidly. Holes in wearing surface will be patched promptly.

b. Steel. Steel surfaces are in the form of metal grating. These surfaces are seldom used due to their original cost, required maintenance, and slippery surface when wet.

c. Asphalt. Many types of bridges have asphalt pavements. Details on maintenance and repair of asphalt pavements are contained in chapter 3 of this manual.

d. Concrete. Concrete slabs and/or overlays are widely used as bridge surfaces. Chapter 4 of this manual contains details on maintenance and repair of concrete pavements.

e. Miscellaneous. Miscellaneous surfaces would include pavement surfaces constructed with tars and epoxies. These surfaces have limited application and are normally used only under specific circumstances. Epoxies have had some use as patching materials, especially on concrete pavements.

8-3. Types and causes of bridge surface distress

Distress to the roadway can be caused by deterioration or movement of the bridge structure. These bridge distresses must be corrected before the roadway can be restored.

a. Asphalt pavements. Chapter 3 covers the types and causes of distress in asphalt pavements. Bridges present special problems in that the pavement is subjected to more rapid changes in temperature resulting in greater expansion and contraction.

b. Concrete pavements. Factors causing deterioration in concrete slabs and decks are freezing, thawing, salt action, temperature variations that set up severe differential stresses and strains within the concrete mass, and unsound aggregates that are vulnerable to weathering from moisture and freezing. Leaching (water seeping through cracks and voids dissolving the calcium hydroxide) will also cause deterioration. Wear and abrasion from traffic, foundation movements, and shrinkage and flexure forces that set up tensile stresses will cause cracking and deterioration. Where road salts are used, these can work their way through the concrete cracks and corrode the reinforcing steel (fig 8-1).

8-4. Methods for maintenance and repair of bridge surfaces

a. Inspection Alignments of handrails and floor and gutter profiles will be checked for any unusual movements that might have occurred. The roadway surface will be checked and patched, where needed, to maintain a smooth riding surface. The roadway drains, outlets, and expansion joints will be cleaned and any maintenance necessary for their good working condition will be accomplished.

b. Maintenance. The following are general maintenance requirements which must be performed periodically depending on the type of bridge involved. Fouled expansion joints will be cleaned and freed. Bearing plates will be cleaned and greased so that all moving parts are in free operating condition. Handrails will be checked for alignment or cracking. Misalignment or cracking indicates settlement or movement of the structure has occurred. If major repairs to piers, footings, and general structure are necessary, the repairs will be supervised by a competent bridge engineer. If leakage infiltrates cracks or joints, they will be cleaned and filled with the proper sealant (see chap 3 or 4, depending on the type of surface).

c. Repair methods.

(1) *Timber repair.* Floor planks will be laid with the heart side down because it is more resistant to decay. In order to have a good drainage and air circulation and to provide for expansion, a V4-inch spacing will be provided between planks. Structural grade hardwood planks 6 to 10 inches wide are preferred because wider planks have a tendency to curl. All spikes will be driven so that their heads are

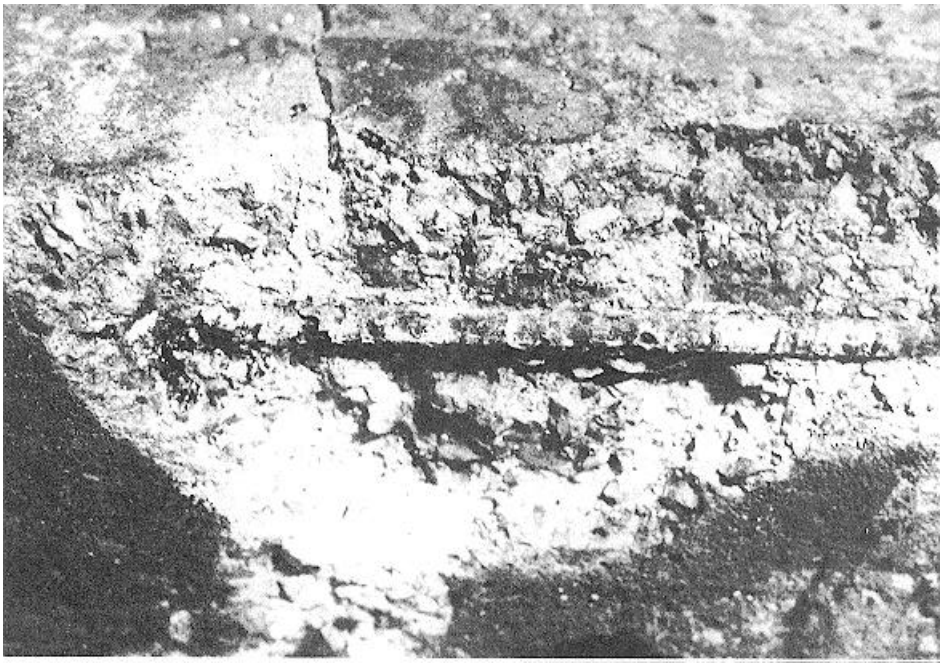

Figure 8-1. Exposed reinforced steel.

imbedded into the plank. The flooring planks of the same thickness will be placed adjacent to each other with a full, even bearing on the stringers. Shims or wedges will not be used to level flooring because they are easily dislodged and leave the flooring in a loose uneven condition.

(a) Wheel guards. In repairing wheel guards, use the same size sections as in the original structure and fasten with the same bolt spacing. The bolts will be extended through the riser or scupper blocks and floor planks.

(b) Handrails. Handrails will be replaced with new bolts and knee braces where needed. Handrails will be painted after repair with three coats of durable, highly visible outside paint.

(2) Patching. Patching will usually involve any one of three materials: asphalt, concrete, or epoxy. The patching procedures for asphalt and concrete are found in chapters 3 and 4 of this manual. There are many different types of epoxy materials available for repairs. They will be used to repair concrete pavements and only used on asphalt surfaces in emergencies because any rigid patch material does not do as well on asphalt as a flexible patch material. Epoxies are very temperature dependent; they take longer to cure in cool and overcast weather. Epoxies are recommended where traffic is necessary on the patched area within a few hours patching.